

Chapter 3

Regional Investigations and Site Reconnaissance

3-1. General

Regional geologic and site reconnaissance investigations are made to develop the overall project geology and to scope early site investigations. The required investigation steps are shown in Figure 3-1. Detailed guidance on the conduct of these investigations is contained in EM 1110-1-1804. Additional guidance specific to determining the probable need for a test quarry, development of potential test quarry locations, and definition of necessary site investigations is provided in the following paragraphs.

3-2. Initial Regional Geology Studies

The overall regional geologic model resulting from inter-agency coordination, literature surveys, and map and remote sensing studies will assist in the decisions concerning the most efficient and economical project components and their tentative siting. As this project formulation proceeds, the potential need, or lack thereof, for produced rock materials will develop. During the coordination and information survey stages, information can be sought concerning existing sources of rock material in the region. On-line computer aided information retrieval services are readily accessible and can provide detailed reference lists. Information on regional and local geology, etc., relevant to site selection and design may be available from the U.S. Geological Survey. The U.S. Bureau of Reclamation maintains data on their project quarries as a function of broad rock genesis. Additional information on data sources is contained in EM 1110-1-1804. As part of the development of the geology of the region, special attention should be paid to the existence of regional stress fields in terms of how they may affect potential quarry excavations and produced rock products. In addition to determining groundwater conditions for normal project purposes, their effect on potential quarry excavations should be assessed.

3-3. Field Reconnaissance

Field reconnaissance should be made concurrent with, or immediately following the regional geologic studies. While the field reconnaissance stage does not include detailed studies such as geologic mapping, there are a number of observations that can be made that will assist in the decision to employ test quarry programs and in the probable quality of rock fill material that would be produced. Rock types, as noted from existing geologic maps, literature, and remote sensing studies can be confirmed. Tentative depths of overburden and weathered rock can be established. Outcrop observations can provide preliminary information on geologic structure and fracture frequency. Terrain conditions as they relate to tentatively selected required excavations can be determined. From the information obtained during the field reconnaissances, preliminary test quarry layouts can be developed, blasted rock gradations and relative amounts of rock waste can be predicted, follow-on investigations planned and program costs can be estimated.

3-4. Survey of Existing Excavations

As part of the field reconnaissances, or as a separate activity, known existing rock quarries and underground excavations, such as mines and tunnels should be visited and assessed. The USAEWES (1988) Technical Memorandum 6-370 provides information on, and test data from, quarries in the local area. Information can be obtained on lithology, structure, and fabric for the same or rock types similar to those at the tentative project locations. Information on produced rock gradations and amounts of rock waste can be obtained. Blasting patterns, types of explosives and blasting procedures can be assessed. Information on required processing and processing equipment (grizzlies, crushers, screens, etc.) can be obtained. When visiting quarry operations, check sheets should be prepared and filled out to assure that pertinent information is obtained. Items which should be included in such check sheets are shown in Table 3-1.

DEVELOPMENT OF REGIONAL GEOLOGY

DATA COLLECTION

INTERAGENCY COORDINATION AND COOPERATION

Sources of geologic, hydrologic and soils data; insight into geologic hazards and HTRW problems; seismicity; construction materials; prior regional experience.

SURVEY OF AVAILABLE INFORMATION

Information similar to that obtained in interagency coordination; published data on material properties; geologic conditions and history; hazards; ground water studies.

MAP STUDIES

Formation descriptions and contacts; soil types and locations; gross structure, fault locations; drainage, slopes, landslides; springs; quarries; etc.

REMOTE SENSING STUDIES

Landforms; drainage; linears; soil and rock type boundaries; outcrops; seeps; sinkholes; slopes; erosion features; vegetation; etc.

FIELD RECONNAISSANCES

Ground truth for remote sensing; outcrop descriptions; site terrain; soil depths and descriptions; springs; observable structure, bedding, joints; possible structure locations; mine and excavation surveys.

DATA ANALYSIS

DISTRIBUTION OF ROCK TYPES

Transition from time-stratigraphic units to grouping of rock materials by physical characteristics.

DISTRIBUTION OF SOIL TYPES

Equate geologic/soil nomenclature to engineering nomenclature.

GEOLOGIC STRUCTURE

Establish spatial location of rock materials; locate major structural features; determine probable distribution of more detailed structural and textural features.

GEOLOGIC HISTORY

Genesis of rock types; relationship to significant properties; rock and soil depositional processes; relationship to properties and preconsolidation history.

SEISMICITY

Historical seismicity; locations and characteristics of probable capable faults; possible earthquake magnitudes in region; possible intensities at candidate sites; preliminary selection of ground motions at candidate sites.

HYDROGEOLOGY

Regional ground water picture; general hydraulics of subsurface materials; probable ground water and seepage conditions at candidate sites; preliminary assessment of project impact on ground water.

CONSTRUCTION MATERIALS

Existing sources in region located; probable areas for rock and soil sources delineated

Regional geologic and soils conditions established; preliminary assessments of seismicity and construction materials; tentative models of geologic conditions at potential sites developed; preliminary inputs to EIS and HTRW reports developed.

Figure 3-1. Schematic diagram of the development of regional geology (adapted from EM 1110-1-1804)

Table 3-1
Items for Inclusion in Quarry Inspection Check Sheets

Project and quarry	Blast hole drilling sizes and patterns	Rock size and gradation requirements
Dates of operation		
Purpose of quarry	Explosives used and powder factors	Volumes of rock produced
Rock type with lithologic descriptions	Hauling and processing equipment	Records of disputes between contractor and client
Rock structure and fabric	Relation of natural block sizes to rock comminution	Rock service records
Descriptions and costs of investigations	Amounts of rock waste	Remarks
Lab test data		